

# Writing the Equation of a Quadratic Function

## Method 1: Given <sup>Solutions</sup> Roots <sup>zeros</sup> <sub>x-intercepts</sub>

Example: Write the equation of the quadratic with roots 3 and -5

$$x = 3$$

and

$$x = -5$$

Set  $x =$  each root

$$x - 3 = 0$$

and

$$x + 5 = 0$$

Make each equation  $= 0$

$$(x - 3)(x + 5) = 0$$

Make each eq. a factor

$$x^2 + 5x - 3x - 15 = 0$$

FOIL / Double-distribute

$$x^2 + 2x - 15 = 0$$

Box Method

Ex 2: Roots  $\frac{1}{4}$  and  $-3$

You Do:

$$x = \frac{1}{4}$$

$$x = -3$$

$$4(x - \frac{1}{4}) = 0$$

$$x + 3 = 0$$

$$(4x - 1)(x + 3) = 4x^2 + 12x - x - 3$$

2) Roots  $-4$  and  $5$

$$4x^2 + 11x - 3 = 0$$

1) Roots  $6$  and  $2$

$$x = \quad \text{and} \quad x =$$

$$= 0 \quad \text{and} \quad = 0$$

$$( \quad )( \quad ) = 0$$

$$= 0$$

Do p. 304 # 35, 37, 39

## Method 2: Given vertex and a point

Example: Write the equation of the quadratic function with a vertex of  $(-2, 3)$  through the point  $(1, 9)$

Use vertex form:  $y = a(x - h)^2 + k$  because I was given vertex

$$y = a(x + 2)^2 + 3$$

plug vertex in for (h, k)

$$9 = a(1 + 2)^2 + 3$$

plug in x and y from given point

$$9 = a(3)^2 + 3$$

$$9 = 9a + 3$$

$$6 = 9a$$

simplify; solve for a

$$a = \frac{6}{9} = \frac{2}{3}$$

$$y = \frac{2}{3}(x + 2)^2 + 3$$

plug a into the equation

You Do

1) Vertex  $(1, 6)$  through  $(3, 20)$

2) Vertex  $(-4, -1)$  through  $(0, 15)$  <sup>y-intercept!</sup>

$$y = a(x - h)^2 + k$$

$$y = a(x \quad )^2$$

$$= a(x \quad )^2$$

$$a =$$

$$y =$$